

PATENT APPLICATION No. 10/661,466
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Amendments to the Claims

Claims

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- 1 1. (Original): A quantum information processing platform comprising,
2 a plurality of quantum information processing elements each having,
3 a cage defining a cavity formed from a plurality of self-assembling protein molecules,
4 and one or more cargo elements located within the cavity, wherein
5 at least one of the cargo elements comprises a qubit programmable into a plurality of
6 logical states.
- 1 2. (Original): A quantum information processing platform according to claim 1, wherein the
2 quantum information processing elements comprise,
3 receptors for capturing and positioning the one or more cargo elements within the cavity.
- 1 3. (Original): A quantum information processing platform according to claim 2, wherein
2 the quantum information processing elements comprise,
3 a vesicle located within the cage and enclosing the one or more cargo elements, wherein
4 the receptors extend through the vesicle to capture and position the cargo element within the
5 vesicle.
- 1 4. (Original): A quantum information processing platform according to claim 3, wherein the
2 quantum information processing elements comprise,
3 adaptors disposed between the receptors and the cage and binding to the receptors.
- 1 5. (Original): A quantum information processing platform according to claim 1, wherein the
2 quantum information processing elements comprise,
3 a vesicle located within the cage and enclosing one or more cargo elements.
- 1 6. (Original): A quantum information processing platform according to claim 1, wherein the
2 quantum information processing elements comprise,
3 molecular tethers for capturing and positioning one or more cargo elements within the
4 cavity.
- 1 7. (Original): A quantum information processing platform according to claim 1, wherein the
2 quantum information processing elements comprise,
3 direct cage bonding for capturing and positioning one or more cargo elements within the
4 cavity.

- 1 8. (New:) A quantum information processing platform according to claim 1, wherein the
- 2 quantum information processing elements comprise,
 - 3 a functionalized cage for attaching one or more elements externally to the cage.
- 1 9. (Original): A quantum information processing platform according to claim 1, wherein the
- 2 quantum information processing element comprise, receptors, molecular tethers and direct cage
- 3 bonding for capturing and positioning one or more cargo elements within the cavity.
- 1 10. (Original): A quantum information processing platform according to claim 1, wherein the
- 2 one or more cargo elements of a subset of the quantum information processing elements further
- 3 comprises a non-permeable cavity.
- 1 11. (Original): A quantum information processing platform according to claim 3, wherein the
- 2 one or more vesicles of a subset of the quantum information processing elements further
- 3 comprises a non-permeable cavity.
- 1 12. (Original): A quantum information processing platform according to claim 1, wherein
- 2 the cage is electrically neutral and inhibits charge transfer between the cage and its cargo
- 3 elements.
- 1 13. (Original): A quantum information processing platform according to claim 1, wherein
- 2 the cage reduces the tendency of a plurality of logical states in a coherent state to collapse into a
- 3 decoherent state.
- 1 14. (Original): A quantum information processing platform according to claim 1, wherein the
- 2 cage inhibits non-quantum information processing cargo elements from interfering with qubit
- 3 cargo element operation in other cages.
- 1 15. (Original): A quantum information processing platform according to claim 3, wherein the
- 2 vesicle is electrically neutral and inhibits charge transfer between the vesicle and its enclosed
- 3 cargo elements.
- 1 16. (Original): A quantum information processing platform according to claim 3, wherein the
- 2 vesicle is insulative and reduces the tendency of a plurality of logical states in a coherent state to
- 3 collapse into a decoherent state.
- 1 17. (Original): A quantum information processing platform according to claim 4, wherein the
- 2 receptors and adaptors are electrically neutral and inhibit charge transfer between the vesicle and
- 3 cage and their cargo elements.

- 1 18. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage reduces contaminant background radiation to cargo carried within the cage.
- 1 19. (Original): A quantum information processing platform according to claim 3, wherein the
2 vesicle reduces contaminant background radiation to cargo carried within the vesicle.
- 1 20. (Original): A quantum information processing platform according to claim 1, comprising
2 a self-assembling framework of cages to structurally support one or more of the self-assembling
3 quantum information processing elements.
- 1 21. (Original): A quantum information processing platform according to claim 1, comprising
2 a self-assembling electrically neutral substrate of cages to structurally support one or more of the
3 self-assembling quantum information processing elements.
- 1 22. (Original): A quantum information processing platform according to claim 1, comprising
2 a self-assembling framework of cages to structurally order one or more self-aligning ones of the
3 quantum information processing elements.
- 1 23. (Original): A quantum information processing platform according to claim 1, wherein
2 the one or more cargo elements of a subset of the quantum information processing elements is a
3 single cargo element comprising a qubit programmable into a plurality of logical states.
- 1 24. (Original): A quantum information processing platform according to claim 1, wherein the
2 one or more cargo elements of a subset of the quantum information processing elements are a
3 plurality of cargo elements.
- 1 25. (Original): A quantum information processing platform according to claim 23, wherein
2 the plurality of cargo elements are qubits programmable into a plurality of logical states.
- 1 26. (Original): A quantum information processing platform according to claim 23, wherein at
2 least some of the plurality of cargo elements are non-quantum information processing cargo
3 elements.
- 1 27. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein the one or more cargo elements of a subset of the quantum information processing
3 elements respond to stimuli internal and or external to the cage.
- 1 28. (Currently amended): A quantum information processing platform according to claim 3,
2 wherein the one or more vesicles of a subset of the quantum information processing elements
3 respond to stimuli internal and or external to the vesicle.

1 29. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein the one or more quantum information processing elements and their qubit and non-QIP
3 cargo are used in vitro and or in vivo.

1 30. (Currently amended): A quantum information processing platform according to claim 23,
2 wherein a subset of the non-quantum information processing cargo elements include one or more
3 therapeutic single task and or multitask in vivo and or in vitro agents.

1 31. (Withdrawn):

1 32. (Withdrawn):

1 33. (Withdrawn):

1 34. (Original): A quantum information processing platform according to claim 23, wherein a
2 subset of the qubit and non-quantum information processing cargo elements include one or more
3 quantum dots.

1 35. (Original): A quantum information processing platform according to claim 23, wherein a
2 subset of the qubit and non-quantum information processing cargo elements include one or more
3 photonic dots.

1 36. (Original): A quantum information processing platform according to claim 23, wherein a
2 subset of the cargo elements include one or more liquids without dopants or with one or more
3 dopants of any type.

1 37. (Original): A quantum information processing platform according to claim 23, wherein a
2 subset of the qubit and non-quantum information processing cargo elements include a gas or
3 vapor without dopants or with one or more dopants of any type.

1 38. (Original): A quantum information processing platform according to claim 1, wherein the
2 at least one qubit of a subset of the plurality of quantum information processing elements are
3 programmed by one or more pulses of electromagnetic radiation.

1 39. (Withdrawn):

1 40. (Withdrawn):

1 41. (Withdrawn):

1 42. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein ~~the~~ at least one qubit of a subset of the quantum information processing elements
3 ~~includes an unpaired electron~~ and the plurality of logical states of the qubit are defined by one or
4 more electron spin polarization properties and or attributes.

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- 1 43. (Withdrawn):
- 1 44. (Withdrawn):
- 1 45. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein the at least one qubit of a subset of the quantum information processing elements
3 includes a nitroxide molecule one or more species of molecules.
- 1 46. (Withdrawn):
- 1 47. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein the at least one qubit of a subset of the quantum information processing elements
3 includes a qubit that is photon-based and the plurality of logical states of the photon-based qubit
4 includes a coherent logical state.
- 1 48. (Original): A quantum information processing platform according to claim 1, wherein the
2 plurality of logical states includes a coherent state.
- 1 49. (Original): A quantum information processing platform according to claim 1, wherein the
2 plurality of logical states includes a coherent state at room temperature.
- 1 50. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage bioengineered in whole or in part.
- 1 51. (Original): A quantum information processing platform according to claim 1, wherein the
2 self-assembling protein molecule is a clathrin molecule
- 1 52. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage comprises self-assembling synthetic protein molecules.
- 1 53. (Currently amended): A quantum information processing platform according to claim 4,
2 wherein receptors, adaptors, and vesicle comprise natural and or synthetic protein molecules.
- 1 54. (Original): A quantum information processing platform according to claim 4, wherein the
2 receptors, adaptors, and vesicle are bioengineered in whole or in part.
- 1 55. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein at least a portion of the cage is metal-coated in one or more materials.
- 1 56. (Currently amended): A quantum information processing platform according to claim 4,
2 wherein at least a portion of the receptors, adaptors, and vesicle is metal coated in one or more
3 materials.
- 1 57. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage is substantially greater than one nanometer in diameter.

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- 1 58. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage is at least about 50 nanometers in diameter.
- 1 59. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage is at least about 100 nanometers in diameter.
- 1 60. (Original): A quantum information processing platform according to claim 1, wherein the
2 cage is symmetric with respect to a plane.
- 1 61. (Original): A quantum information processing platform element according to claim 1,
2 wherein the cage has icosahedral geometry.
- 1 62. (Original): A quantum information processing platform according to claim 1, wherein at
2 lease one of the plurality of cages includes a plurality of qubits and a subset of the plurality of
3 qubits are linearly positioned at vertices along a single plane using circulant ordering.
- 1 63. (Original): A quantum information processing platform according to claim 1, wherein a
2 subset of the quantum information processing elements are physically linked together.
- 1 64. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein a subset of the quantum information processing elements are functionally linked
3 together, either locally and or at a distance.
- 1 65. (Original): A quantum information processing element according to claim 1, comprising
2 an encoder for programming the at least one qubit of a subset of the quantum processing
3 elements.
- 1 66. (Original): A quantum information processing element according to claim 1 comprising,
2 a decoder for reading information out of the at least one qubit of a subset of the quantum
3 processing elements.
- 1 67. (Currently amended): A quantum information processing platform according to claim 1,
2 wherein a subset of the quantum information processing elements form a hybrid system upon
3 their physical and or functional integration with non-invention elements *in vitro* and or *in vivo*.
- 1 68. (Original): A method for a quantum information processing platform comprising,
2 providing one or more quantum information processing elements, each quantum
3 information processing element comprising
4 a cage defining a cavity formed from a plurality of self-assembling protein molecules,
5 and
6 one or more cargo elements located within the cavity, wherein,

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- 7 at least one of the cargo elements comprises a qubit programmable into a plurality of
- 8 logical states;
- 9 programming the one or more quantum information processing elements using an
- 10 encoder; and
- 11 reading information from the one or more quantum information processing elements
- 12 using a decoder.